

REMARKS

With claims 1-31 pending, claim 30 has been cancelled, as shown above. Further, claims 1-3, 18, 19, 27-29 and 31 have been amended as described below.

Section 112, Second Paragraph, Rejection

Claims 1-4, 9-15, 18, 19, 22 and 27-29 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Regarding claims 1, 27 and 28 the Office Action indicates that the term “lithographic compliant interconnects” is confusing and indefinite. The Office Action indicates that further clarifying language is needed to indicate whether it is lithographically joined to the pad, or whether the whole interconnect is lithographically formed. Further, regarding claims 1 and 28, the Office Action indicates that the presence of a process limitation in a product claim cannot impart patentability. Regarding claim 29, the Examiner states that the term “non-contacting compliant interconnects” is unclear and indefinite. Based on the above amendments and the following remarks, this rejection is now believed overcome.

Claims 1 and 28 have been amended to replace the term “lithographic compliant interconnects” with simply “compliant interconnects.” Claims 2-3, which are dependent on claim 1, have likewise been amended. The term “compliant interconnects” is believed definite under 35 U.S.C. § 112, second paragraph, based at least on the definition provided in paragraph 35 of Applicant’s specification.

Claim 27 has been amended to replace the term “lithographic compliant interconnects” with “multi-layered compliant interconnects.” Paragraph 69 of Applicant’s specification describes multi-layered compliant interconnects formed using a lithographic process.

Claim 29 has been amended to remove the term “non-contacting compliant interconnects,” and to claim “a first number of compliant interconnects” with a die mounted

on them, and “a second number of the compliant interconnects not contacting the die, the second number serving as heat sinks,” to accurately describe what “not contacting” means.

Based upon the above amendments and remarks, all of claims 1-4, 9-15, 18, 19, 22 and 27-29 are now believed allowable under 35 U.S.C. § 112, second paragraph.

Section 103 Rejection

Claims 1-4, 9-15, 18, 19, 22, 27 and 28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Herrell taken with either DiStefana (224) or Dozier, II (149). The Examiner states that Herrell discloses the claimed invention, except the lithographic features. The Examiner states that it would have been obvious to use the well known lithographic compliant contact details described in the secondary references to modify the interconnects 38 of Herrell to save space by employing closer tolerances and dimensions. Based on the above amendments, and the following remarks, this rejection is now believed overcome.

Claim 1 has been amended claim “at least one die with active electronic components non-rigidly mounted on second ends of the compliant interconnects within the cavity.” Such a non-rigid connection is disclosed at least in paragraph 35 of Applicant’s specification. Herrell is not believed to teach or disclose dies “non-rigidly mounted” to compliant interconnects. The interconnects 38 of Herrell are leads rigidly attached to an integrated circuit (IC) chip. The leads are then soldered to a substrate. See Herrell column 8, lines 56-60 and column 11, lines 18-21. Claims 27-28, similar to claim 1, have been amended to claim electronic components “non-rigidly” coupled to compliant interconnects, and are likewise believed to distinguish over Herrell. With disclosure of Herrell of rigidly connecting both ends of compliant interconnects 38, replacing the interconnect structure of Herrell with that of DiStefana or Dozier, II would not create the non-rigidly connected interconnects now claimed by applicant in claims 1 and 27-28. Claims 1 and 27-28 are, thus, believed allowable as non-obvious under 35 U.S.C. 103 as being unpatentable over Herrell taken with either DiStefana (224) or Dozier, II (149).

Claims 2-4, 9-15, 18, 19 and 22 are believed allowable over Herrell in view of DiStefana or Dozier, II based at least on their on their dependence on amended claim 1.

Section 102 Rejection

Claims 29 and 30 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Herrell. Claim 30 has been cancelled rendering this rejection moot with respect to that claim. Regarding claim 29, the Office Action states that the non-contacting language, as far as understood in view of the 112 rejection, is shown by the Herrell interconnects 38 which are “non-contacting” at their mid-portions. Based on the above amendments to claim 29, and the following remarks this rejection is now believed overcome.

Claims 29 has been amended to claim “compliant interconnects not contacting the die” rather than the general term “non-contacting interconnect” which could be interpreted as not contacting anything at a midpoint. Herrell does not disclose interconnections 38 which do not contact a die, remaining only to serve as a heat sink. Claim 29, as amended, is thus believed to be allowable as not anticipated under 35 U.S.C. § 102(b) by Herrell.

Section 103 Rejection of Claim 31

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over either Khandros (213) or Khandros (707) taken with Herrell. The Office Action states that Khandros (213) provides substrates 104/108 with compliant interconnects 110 and devices 102/106. The Examiner further states that Fig. 32 of Khandros (707) provides a similar teaching, and that either reference could be employed with the Herrell cooling system to better cool known heat producing components. Based on the above amendments and the following remarks, this rejection is now believed to be overcome.

Claim 31, as amended, claims top and bottom substrates forming a cavity, “the substrates coupled to each other using compliant interconnects located within the cavity; [and] at least one die within the cavity electrically connected through the top substrate and

the compliant interconnects to a surface of the bottom substrate external to the cavity.” As such, the compliant interconnects enable signals to be coupled from the die in a cavity through the top substrate to a surface of the bottom substrate external to the cavity. Khandros (707) and Khandros (213) teach compliant interconnects electrically connecting a cavity between two substrates, but not further electrically connecting a die in the cavity from the top substrate on which it is mounted through a compliant interconnect to a surface of the bottom substrate external to the cavity. Combining Khandros (707) and Khandros (213) with Herrell would not better cool known heat producing components, in contrast with the statement of the Office Action, since the interconnects would obstruct the flow of coolant, potentially reducing cooling ability of the Herrell configuration. Claim 31 is thus now believed non-obvious under 35 U.S.C. § 103 over Khandros (707) or Khandros (213) employed with Herrell.

Allowable Subject Matter

Claims 5-8, 16, 17, 20, 21 and 23-26 are indicated by the Office Action as being allowable.

Conclusion

In light of the above amendments and remarks, claims 1-29 and 31 are now all believed to be in condition for allowance. Accordingly, reconsideration and allowance of these claims is respectfully requested.

A petition for a one month extension of time, along with the required fee is provided with this response.

Respectfully submitted,

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